

PATENT SPECIFICATION

DRAWINGS ATTACHED

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COMPLETE SPECIFICATION

Improvements of and relating to anti-roll Stabilizers of Ships

I, FRANZ SÜBERKRUB, of Chilehaus C, VI, Hamburg, 1, Germany, of German Nationality, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The invention relates to an arrangement for damping the rolling movement of ships.

It is the object of the invention to eliminate the disadvantages which are inherent particularly in installations attempting the anti-roll stabilization by means of fins which in use are extended on both sides of the ship from appropriate fin chambers and produce moments opposed to the rolling of the ship by automatically controlled rotary movements.

There is a known device of this kind in which the fins are each connected with a fin shaft having two bearings. The first of these bearings is located within the fin chamber, serving to receive the fin in the retracted, i.e., in the resting position, whilst the second bearing is located within the hull of the ship. Between the first and the second bearing, the fin shaft passes through a stuffing box in the wall of the fin chamber adjacent to the hull. Both bearings are located in bodies, so-called traverses, which, in order to make possible the movement of the fin out of the chamber, or its retraction into the same, are slidably located on slides or rails, which are positioned athwartships.

This design has the disadvantage of requiring much room athwartships, because each fin shaft moves from the fin chamber towards the inside of the ship by the same amount as the amount by which the fin moves into the fin chamber, so that a space sufficient for this movement must be provided.

This disadvantage of requiring a space equal to the length of the fin movement in addition to the space for the fin chamber

itself may be avoided according to this invention. This invention consists in an arrangement for damping the rolling of a ship, comprising fin chambers provided in the hull on both sides of the ship, each chamber having an opening towards the outside of the hull, a displaceable body being mounted in each fin chamber for athwartship movement and carrying a stabilizer fin, the displaceable body being movable athwartships by actuating means including a first transmission system powered by a first motor located outside the fin chamber and within the hull of the ship, and the fin being rotatable about an athwartship axis by rotating means including a second transmission system powered by a second motor located outside the fin chamber and within the hull of the ship, all components of the first and second transmission systems which execute an athwartships movement together with the displaceable body being located in the fin chamber, or in a space communicating with the fin chamber.

The invention will be further described, by way of example, with reference to the accompanying drawing, of which Fig. 1 to 4 show one embodiment of the invention, and Fig. 5 to 7 a second embodiment, and in which:—

Fig. 1 is a schematic, partly sectional view of a fin chamber with the fin in operating position and its actuating means, seen in the direction of the longitudinal axis of the ship;

Fig. 2 is a plane view of Fig. 1;

Fig. 3 is a view of the fin chamber with actuating means, seen from within the ship;

Fig. 4 is a view of the fin chamber, similar to that of Fig. 3, but seen from the opposite side;

Fig. 5 is a view similar to that of Fig. 1, showing a second embodiment of the invention;

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Fig. 6 is a section along the line VI—VI of Fig. 5;

Fig. 7 is a view of the fin chamber with actuating means of Fig. 5, seen from within the vessel.

With reference to Fig. 1 to 4, one fin chamber 14 is arranged on each side of the ship in the hull, adjacent to the shell 40, and located athwartships, and having opening 41 towards the outside of the ship.

Sliding tracks or rails 4, 5 are located athwartships in said fin chamber 14, on which a body 3 may be displaced to and fro. Said body 3, also called a traverse, carries the fin 1, which, if the body 3 is displaced towards one side, is made to protrude through the opening 41 of the fin chamber 14 towards the outside into its operating position, and *vice versa*, by sliding said body towards the other side, retracted into the fin chamber into the inoperative position. Between these two sliding tracks 4 and 5, there is fitted to the base of the fin chamber 14, a bearing block, in which a sprocket wheel 21 is rotatably journaled. A second, co-operating sprocket wheel 20 is keyed to a shaft 25. The space, in which said sprocket wheel 20 is located, communicates with the inside of the fin chamber 14. The shaft 25, carrying the sprocket wheel 20, passes from the fin chamber through a stuffing box towards the outside, that is, towards the inside of the ship, and may be rotated from there, through a suitable transmission 24, by an electric motor 23, in one or the other direction. A chain 22 passes over the sprocket wheels 20 and 21; this chain, or its ends, are attached to the body 3. In this way the body 3 may be pulled by means of said electric motor 23 towards the right or left, according to the direction of movement of the chain 22.

The fin 1 may be rotated about a shaft or pin 2, which is firmly fixed in the body 3. It may, however, also be keyed onto said pin 2, in which case said pin is rotatably located in the body 3.

The fin 1 is rotated by a hydraulic motor, which may comprise a cylinder 6 with a pressure-medium-operated piston, the piston rod 7 of which is pivoted to a crank 8, which is fixed to a shaft 9. This shaft 9 is rotatable in the fixed bearings 10, 11 and 12, and extends from the inside of the ship, through a stuffing box 13, into the fin chamber 14. It is arranged parallel to the sliding tracks 4, 5 and located in such a way that it cannot be displaced along its longitudinal axis. Said shaft 9 carries, spaced at a distance, two cranks 15 and 16 of equal size and pointed in the same direction, which are rigidly fixed thereto, so that they cannot shift or rotate relative thereto. The two cranks 15 and 16 carry on their free ends a common connecting rod 17. A lever 18 is fitted to said rod

17 so that it may rotate thereon and be longitudinally displaced, being pivoted to a pin 19 on its other end; this pin 19 is firmly attached to the fin 1.

If the crank 8 is rotated in one or the other sense by the piston moving in the cylinder 6, the just described transmission will also cause a rotation of the fin 1 in one or the other direction.

If the body 3 with the fin 1 moves along the sliding track 4, 5 towards the left, the lever 18 is taken along by the fin 1, sliding on the rod 17 towards the left; if, however, the body 3 with the fin 1 moves towards the right, the head or collar 42 of the pin 19 causes the lever 18 with the fin 1 to move towards the right.

The two cranks 15 and 16, fixed to the shaft 9, may also be replaced by only one crank 16, if this crank is fitted to the shaft 9 in such a way that it participates in the rotary movement of this shaft 9, but is longitudinally displaceable on the shaft 9, and if the lever 18, instead of being rotatably mounted on the rod 17—which may now be omitted—is directly pivoted to the free end of the crank 16.

With reference to Fig. 5 to 7, showing a second embodiment, the fin shaft 2 is hollow drilled. A flange 26 is carried at the end of a square-section shaft 27 which is mounted non-rotatably but axially slidably in a bore in a shaft 28, the shaft 28 being fixed in its axial direction. The fin 1 is retained on the fin shaft 2 by the flange 26. The fin 1 may revolve about the shaft 2, which is firmly fixed in the body 3, but is fixed to the shaft 27. The hollow shaft 28 passes through a stuffing box 29 into the inside of the ship, where it carries a lever or crank 30, which is actuated by the piston rod of a hydraulic motor 31, by means of which the fin 1 may be rotated and located at a certain angular position to the horizontal.

The to-and-fro movement of the fin 1, or of the body 3 carrying the same, is effected in this case by a screwed spindle 32, which is located so that it cannot be displaced longitudinally, and which passes through a stuffing box 33 into the inside of the ship, where it may be rotated through the driving means 34 by the motor 35. Said spindle co-operates with the nut-like part 43 of the body 3, so that its rotation in one sense causes the body 3 and the fin 1 to move in one direction, and its rotation in the other sense causes the body 3 and the fin 1 to move in the other direction.

WHAT I CLAIM IS:—

1. An arrangement for damping the rolling of a ship, comprising fin chambers provided in the hull on both sides of the ship, each chamber having an opening towards the outside of the hull, a displaceable body being mounted in each fin chamber for athwartship

movement and carrying a stabilizer fin, the displaceable body being movable athwartships by actuating means including a first transmission system powered by a first motor located outside the fin chamber and within the hull of the ship, and the fin being rotatable about an athwartship axis by rotating means including a second transmission system powered by a second motor located outside the fin chamber and within the hull of the ship, all components of the first and second transmission systems which execute an athwartships movement together with the displaceable body being located in the fin chamber, or in a space communicating with the fin chamber.

2. An arrangement according to Claim 1 wherein the first transmission system comprises a chain carried between two sprocket wheels rotatably mounted in the fin chamber, one of the sprocket wheels being drivable by the first motor, the displaceable body being attached to a portion of the chain.

3. An arrangement according to Claim 1 wherein the first transmission system comprises a screw-threaded spindle extending athwartships in the fin chamber, being non-displaceable in the athwartships direction, and rotatable by the first motor, the spindle co-operating with a nut-like part of the displaceable body to move the body when the spindle is rotated.

4. An arrangement according to any of the preceding claims wherein the second transmission system comprises a shaft which may be rotated by means of the second motor, the shaft extending athwartships into the fin chamber, and being non-displaceable in the athwartships direction, two cranks being spaced apart and fixed to the shaft, each crank having equal size and pointing in the same direction, the cranks carrying at their free end portions a connecting rod parallel to said shaft, a lever being rotatably and displaceably mounted on the connecting rod with its free end pivoted to a pin so located on

the fin that the pin forms a lever arm for the rotational movement of the fin, the pin also being capable of forcing said lever to participate in the athwartships movement of the displaceable body.

5. An arrangement according to any of Claims 1, 2 or 3 in which the second transmission system comprises a shaft which may be rotated by the second motor, extending athwartships into the fin chamber, and being non-displaceable in the athwartships direction, a crank being mounted on said shaft so as to be rotatable by the shaft but displaceable thereon, and a lever being pivoted to the crank with the free end of the lever pivoted to a pin which is so located on the fin that the pin forms a lever arm for rotating the fin, the pin also being capable of forcing said lever to participate in the athwartships movement of the displaceable body.

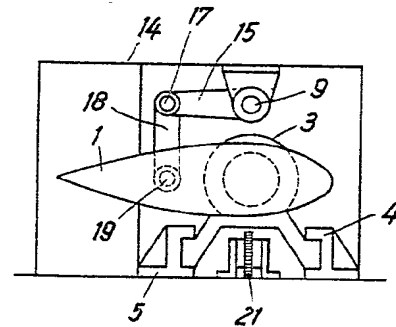
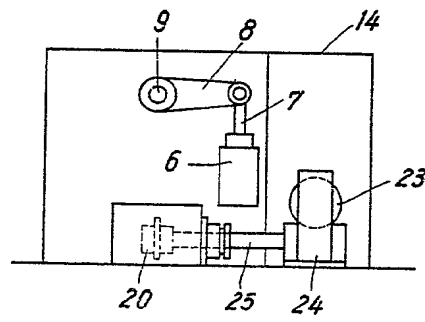
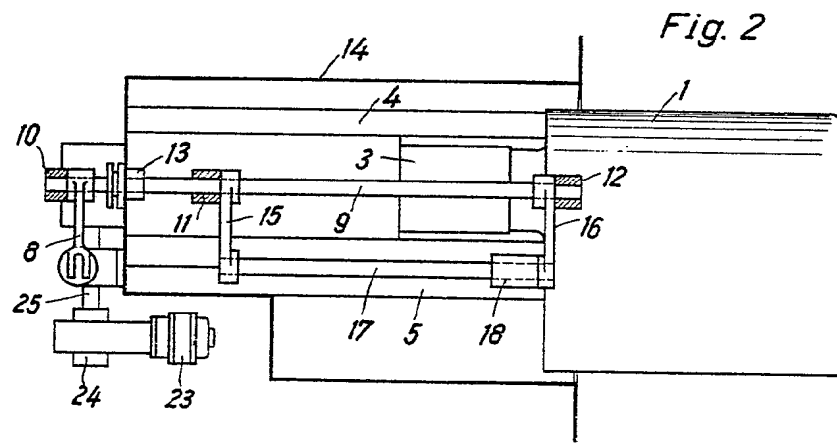
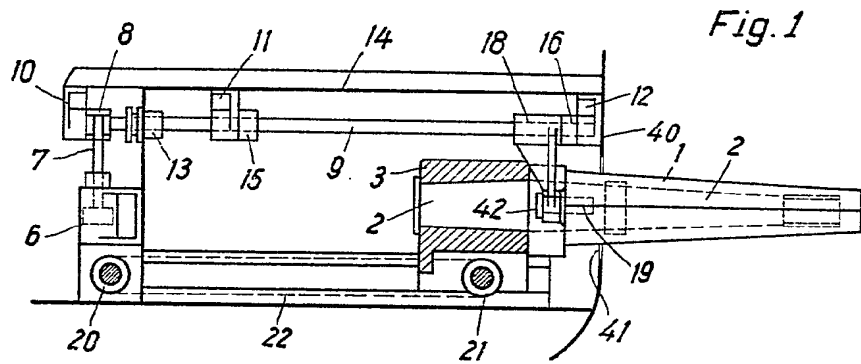
6. An arrangement according to any of Claims 1, 2 or 3 in which the second transmission system comprises a shaft, which may be rotated by the second motor, extending athwartships into the fin chamber, a rod, fixed to the fin, being located co-axially of said shaft such that a rotary movement of said shaft causes a corresponding rotary movement of the rod and thereby of the fin, and such that the rod remains in rotating connection with said shaft during the athwartships movement of the fin.

7. An arrangement according to Claim 6 wherein said shaft is hollow, said rod being located co-axially within said shaft.

8. An arrangement for damping the rolling of a ship, substantially as hereinbefore described with reference to and as shown in Figures 1—4 of the accompanying drawings.

9. An arrangement for damping the rolling of a ship, substantially as hereinbefore described with reference to and as shown in Figures 5, 6 and 7 of the accompanying drawings.

MARKS & CLERK.



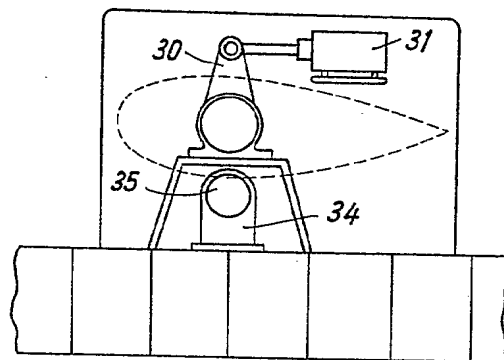
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SHEETS 1 & 2

Fig. 5

A cross-sectional view of a circular component 28. Inside the circle is a square feature 27. The square feature 27 is filled with diagonal hatching lines, while the surrounding circular area 28 is plain.

Fig. 7



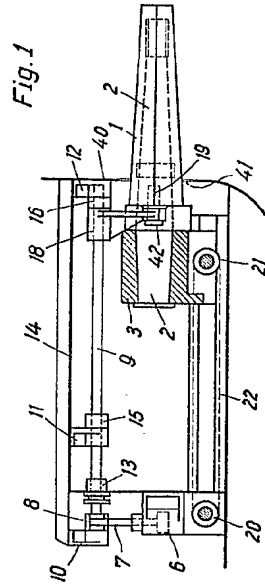


Fig. 1

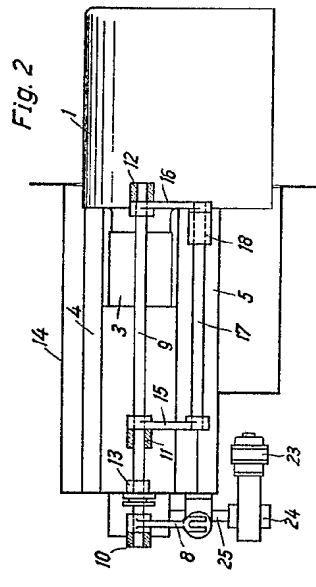


Fig. 2

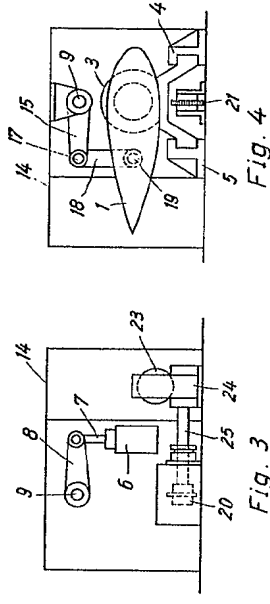


Fig. 3

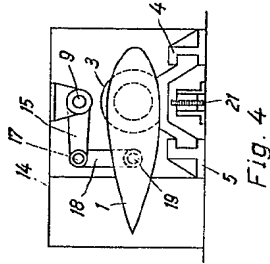


Fig. 4

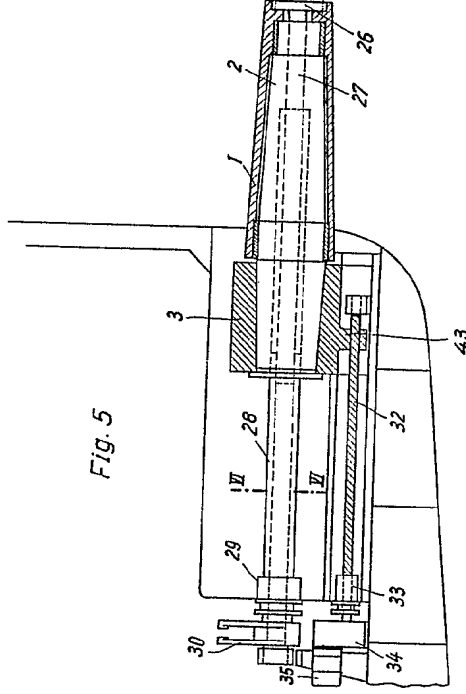


Fig. 5

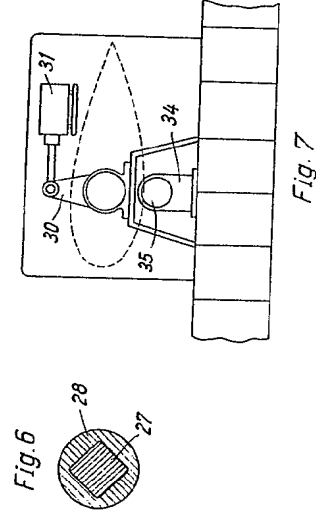


Fig. 6

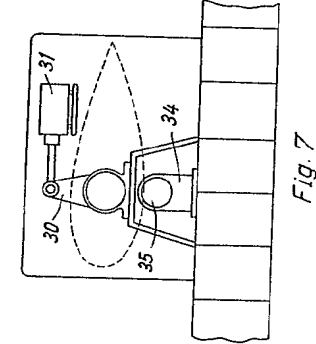


Fig. 7